JPRS 84098

11 August 1983

East Europe Report

SCIENTIFIC AFFAIRS

No. 785

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 84098

11 August 1983

East Europe Report

SCIENTIFIC AFFAIRS

No. 785

FBIS FOREIGN BROADCAST INFORMATION SERVICE

JPRS REPORTS

Japan Report
Korean Affairs Report
Southeast Asia Report
Mongolia Report
Near East/South Asia Report
Sub-Saharan Africa Report
West Europe Report
West Europe Report: Science and Technology
Latin America Report

USSR

Political and Sociological Affairs
Problems of the Far East
Science and Technology Policy
Sociological Studies
Translations from KOMMUNIST
USA: Economics, Politics, Ideology
World Economy and International Relations
Agriculture
Construction and Related Industries
Consumer Goods and Domestic Trade
Economic Affairs
Energy
Human Resources
International Economic Relations
Transportation
Physics and Mathmetics
Space
Space Biology and Aerospace Medicine
Military Affairs
Chemistry
Cybernetics, Computers and Automation Technology
Earth Sciences
Electronics and Electrical Engineering
Engineering and Equipment
Machine Tools and Metal-Working Equipment
Life Sciences: Biomedical and Behavioral Sciences
Life Sciences: Effects of Nonionizing Electromagnetic Radiation
Materials Science and Metallurgy
Meteorology and Hydrology

EASTERN EUROPE

Political, Sociological and Military Affairs
Scientific Affairs
Economic and Industrial Affairs

CHINA

Political, Sociological and Military Affairs
Economic Affairs
Science and Technology
RED FLAG
Agriculture
Plant and Installation Data

WORLDWIDE

Telecommunications Policy, Research and Development
Nuclear Development and Proliferation
Environmental Quality
Epidemiology

FBIS DAILY REPORT

China
Soviet Union
South Asia
Asia and Pacific
Eastern Europe
Western Europe
Latin America
Middle East and Africa

To order, see inside front cover

JPRS 84098

11 August 1983

EAST EUROPE REPORT

SCIENTIFIC AFFAIRS

No. 785

CONTENTS

GABCIKOVO-NAGYMAROS HYDROELECTRIC POWER PLANT PROJECT OUTLINED

Prague DOKUMENTACNI PREHLED in Czech 24 May 83 pp G1-G4

[Text] Gabcikovo-Ngymaros Enterprise

A waterwork system on the Danube River, built jointly by Czechoslovakia and Hungary, according to the agreement signed on September 16, 1977, effective 30 June 1978. Excavation and site preparation began in 1978, the agreement expected construction to be completed in 1991. The total capital expenditure is paid equally by both parties of the agreement on the basis of actual work and supplies.

After completion of the Dunakiliti weir, the derivation canal and the Gabcikovo and Nagymeros cascades, they will be the property of both countries. Other structures of the system built as joint investments will become the property of the state in whose territory they have been built.

Czechoslovakia is building:

--Hrusov-Dunakiliti dam structures on the river's left bank in Czechoslovakia,

--derivation canal--the inlet canal in Czechoslovakia,

--Gabcikovo cascade in Czechoslovakia,

--protection systems for the Nagymaros dam in Czechoslovakia, except for the lower Ipel area,

--recultivation of Czechoslovak territory.

Hungary is building:

--Hrusov-Dunakiliti dam structures on the right bank in Czechoslovakia, including connecting and directing dams,

--Hrusov-Dunakiliti dam structures on the right bank in Hungary,

--Dunakiliti weir in Hungary,

--derivation canal--the outlet canal in Czechoslovakia,

--deepening the Danube River channel below Palkovicov in both Czechoslovak and Hungarian territories,

--adjustments to the old Danube River channel in both Czechoslovak and Hungarian territories,

--operational equipment for Gabcikovo waterworks in Czechoslovakia (means of transportation and maintenance machinery),

--Nagymaros dam protection systems for the lower Ipel area in Czechoslovakia,

--Nagymaros dam protection systems in Hungary,

--Nagymaros cascade in Hungary,

--operational equipment for Nagymaros waterworks in Hungary (transportation means and maintenance machinery),

--deepening the river channel under the Nagymaros cascade in Hungary,

--recultivation of Hungarian territory.

Gabcikovo Waterworks Structures

The Babcikovo waterworks consists of the following structures:

--Hrusov-Dunakiliti dam on the Danube River between 1,860-1,842 river kilometers with a maximum surface level of 131.10 meters above the Baltic Sea in both Czechoslovakia and Hungary,

--Dunakiliti weir and auxiliary lock chamber at 1,842 river kilometers in Hungary,

--derivation canal (inlet and outlet canals) at 1,842-1,811 river kilometers in Czechoslovakia,

--cascade on the derivation canal in Czechoslovakia consisting of a hydroelectric power plant with an installed capacity of 720 MW and two lock chambers with accessories,

--adjustment of the old Danube River channel between 1,842-1,811 river kilometers on the joint Czechoslovak-Hungarian section,

--deepening and channelization of the Danube channel between 1,811-1,791 river kilometers on the joint Czechoslovak-Hungarian section.

The dam and lake between Hrusov and Dunakiliti will have an area of 60 square kilometers and a volume of more than 240 million cubic meters of water. From this lake the Danube's water will flow into a new river channel--the

derivation canal, which consists of a 17-kilometer long inlet canal and an 8-kilometer long outlet canal. The inlet canal, 270 to 740 meters wide, will bring water to the Gabcikovo hydroelectric power station. Here the water flow will have a gradient of 16-21.5 meters and will drive 8 vertical Kaplan turbines with a total power output of 720 MW. The first turbine is expected to begin operation in 1990, the last one in 1993. The turbines will run for 5 to 24 hours a day, depending on the Danube's flow rate. When the turbines are not in operation, water will be stored by the Hrusov dam.

Ships will sail through the new channel through two new lock chambers (which will have the capacity to accommodate a ship train consisting of 1 tow boat and 9 freight boats, each with a displacement of 1,600 tons), and then, having been lowered by about 20 meters, ships will continue down the 8-kilometer long outlet canal to Palkovicovo, where they return to the old Danube channel. The Nagymaros dam, built 110 kilometers down the river, will raise the river surface level at Palkovicovo.

The Nagymaros Waterwork Structures

The Nagymaros waterwork consists of the following structures:

--a dam and necessary protection structures on the Danube between 1,791-1,696.25 river kilometers and in sections of the tributaries affected by the raised river surface, built for a maximum surface level of 107.83 meters above the Baltic Sea in both Czechoslovakia and Hungarian territory,

--cascade at 1,696.25 river kilometers in Hungary consisting of a weir, a hydroelectric power station with an installed capacity of 158 MW and two lock chambers with accessories,

--deepening and channellization of the Danube in Hungary on both its branches between 1,696.25-1,657 river kilometers.

According to the plans developed during preparation period previous to signing this international agreement, the first turbine is expected to begin operation in 1993, while the sixth and last turbine should be ready for operation in 1995. The Nagymaros cascade will function as a balancing reservoir-lake, from which water will flow continuously over the turbines.

Significance

The waterwork system represents a complex multipurpose utilization of the Danube River from 1,860 to 1,657 kilometers. It will strengthen the energetic balance of the participating states. The annual supply is expected to be 3.7 billion kWh of electric energy. The power output from both hydroelectric power stations will be connected to Mir [Peace], the power system of socialist countries. About 4.5 million tons of lignite will be saved annually. After the Czechoslovak-Hungarian sections of the Danube River have been channeled, the Danube-Main-Rhine canal, which will connect the Black Sea to the North Sea, will be opened. The navigation depth will be 3.5 meters. Fords, primarily between Rajka and Bonyll, will be eliminated. In this way the

capacity of the Batislava port will be increased and it will be possible to connect the industrial centers in Southern Slovakia. Also, better conditions for use of the lower sections of Danube's tributaries will be created (Vah, Hron, Ipel and Little Danube). This investment will significantly affect the environment of both countries. It will create conditions for flood protection of the surrounding area (on the Czechoslovak side it will be about 200,000 hectares, on the Hungarian side at least 40,000 hectares). The waterworks will also be used for irrigation of agricultural land. The Hrusov waterworks is also expected to become a tourist center.

9814
CSO: 2402/59

PROGRESS IN DEVELOPING NEW BIOTECHNOLOGIES OUTLINED

Sofia OTECHESTVO in Bulgarian No 10, 24 May 83 pp 8-9

[Transcription of remarks by Prof Dr Tsanko Stoychev, director of Joint Center for Biology of the Bulgarian Academy of Sciences, recorded by Nadezhda Marinova; date and place not specified: "The Strategy of Biotechnologies"]

[Text] Microbes Producing Foods, Drugs, Energy, Fertilizers

. . .

Sheep Like Cows, Chickens Like Turkeys

The Fourth Scientific and Technical Revolution?

At the end of last year a program council on biotechnologies was established under the Presidium of the Bulgarian Academy of Sciences. It is supposed to forecast their development and unify the efforts of scientists of different specialties in creating a near- and long-term program for the use of biotechnologies and bioproducts in agriculture, in the chemical and food industries, in public health services and in power engineering. It is also the program council's task to effect complete integration in this urgent scientific and technical problem area between the institutes of the Bulgarian Academy of Sciences and the corresponding elements in higher educational institutions and the Medical and the Agricultural Academies.

Prof Dr Tsanko Stoychev, director of the Joint Center for Biology of the Bulgarian Academy of Sciences and a member of the program council, acquaints us with some of the problems in the development and practical application of biotechnologies in Bulgaria.

The development of biotechnologies is acquiring strategic importance on a world scale. With their introduction there is even beginning to be talk of a fourth scientific and technical revolution. What does it include? First, the creation through biotechnologies of bioproducts: protein, organic acids, biostimulators, enzymes, vitamins, alkaloids etc. for industry, or as food,

fodder, drugs, and growth regulators in agriculture. Second, the use of biotechnological processes for other needs: treatment of wastewater, leaching of metals by means of micro-organisms etc. Third, the production of energy biologically: biogas from the masses of waste mater from industrial firms and the use of photosynthetic processes to obtain a greater quantity of biomass and fast-growing wood species. Although the application of biotechnologies as a power supply source is limited (in the near future no more than 6 percent of the planet's energy production can be obtained from such sources), this area is very important, too.

Micro-organisms (bacteria, microalgae, fungi etc.)--the producers of biologically active substances--are now the principle subject of research in biotechnologies. We must remember that biotechnologies arose empirically a very long time ago--alcohol, wine and alcoholic beverages have been produced by fermentation for millennia. Modern biotechnologies, however, are based on a good knowledge of micro-organisms. Hence the great role of academic science--in order to develop a biotechnology, it is necessary to know the structure, biochemistry, physiology, productivity and genetics of the micro-organisms in question and to create highly productive strains through selection and artificial mutagenesis.

The process is very complex. It still requires identifying the biological product; creating an in-laboratory, semi-industrial and industrial technique for its production; and studying the possibilities of its use in different industries or manufacturing processes. This presupposes close integration of, and interdisciplinary studies by, microbiologists with physicists, with chemists, mathematicians, physicians, agriculturalists etc.

What has been accomplished thus far?

The Institute of Microbiology of the Bulgarian Academy of Sciences is striving to become the scientific mainstay of the developing microbiological industry and in the creation of new biotechnologies. On the basis of serious fundamental research several have already been developed and are being introduced. Plants in Razgrad have introduced a technique for producing the methyl ester of itaconic acid. The Institute of Plant Physiology has found the most rational application for it in regulating the growth and timely ripening and in increasing the yield of tomatoes. The annual economic effect is estimated at about 1,400,000 leva. Another promising use for this bioproduct of tremendous potential economic significance is now under study--increasing the drought-resistance of wheat.

A joint development of the microbiology and plant physiology institutes is a technique to produce gibberellic acid and use it to increase the yields of grapes, tomatoes and some other agricultural crops. Experiments thus far indicate that it increases grape yields 10-20 percent! It is produced at plants in Peshtera and is already in use on a semi-industrial scale. You know that when a chemical is introduced, its secondary effects must be very seriously studied. It so happens that we are more protected for these biological growth regulators are products of living matter and naturally have fewer risks. A glucose production technique is also being introduced. With it starch is split enzymatically and glucose is obtained.

A milk-coagulating enzyme has also been developed from bacteria. An enzyme preparation from the stomachs of young calves and lambs is used at present for cheese-making. The Institute of Microbiology has devised a technology (being introduced at the plant in Botevgrad) for a milk-coagulating enzyme preparation. With it, under semi-industrial conditions, a white hard brined cheese has been obtained, with a good yield, nonperishable, and with excellent taste qualities. Industrial use of this enzyme is beginning this year.

A very important area where the interdisciplinary potentialities of the Joint Center for Biology are utilized is the development of ASU's [automated control systems] for biotechnological processes. The scientific research laboratory for instrument-building and the automation of biological experimentation, in close cooperation with the Institute of Microbiology, is developing an ASU for fermentation processes. Contracts have already been entered into and such systems are being devised for the plants in Peshtera and in Razgrad. Associated with fermentation processes is the technology for obtaining biogas from poultry farm wastes, on which the special-research group for the ecology of industrial animal husbandry is working. An experimental fermentation system is already in operation in Vidin and methane is being produced. But a number of problems in optimizing these processes with very great effect (cleaning up the environment, production of energy and of more efficient fertilizer) still have to be solved.

In creating modern bioproducts and biotechnologies, our scientists do not rely solely on our own original scientific research, but study, adapt and transfer foreign experience as well. Biotechnologies are dependent on climatic conditions, on geographical position, on nutrient media, on productivity. A microorganism that is highly productive in our country may be unproductive elsewhere. In consequence, the adaptation of foreign biotechnology requires a great deal of science. An elementary example is yogurt. Bacillus bulgaricus exported abroad loses its activity in a week! This indicates how important the regional characteristics, the regional peculiarities of the biotechnology and of the biological activity of the micro-organisms are.

The Institute of Morphology is working on a very interesting problem--a technology for producing hybridomas and monoclonal antibodies. What is a hybridoma? Stated most simply, the linking of a cancer cell with a lymphocyte (the cells that produce antibodies). When such a hybrid is obtained and introduced into an experimental animal, the animal begins to produce antibodies, called monoclonal antibodies. They exhibit a specific affinity for cancer cells and if they are introduced into a sick organism, they accumulate selectively and specifically in the cancerous tissue. The institute has already obtained the first monoclonal antibodies, has not yet arrived at a biotechnology for producing them industrially, but has promising results. If such antibodies are combined with an oncolytic agent, they likewise will accumulate selectively in the cancerous tissue. An oncolytic effect intensified manyfold is obtained despite the attenuated total toxicity of the preparation.

A few more examples. The Institute for the Biology and Immunology of Reproduction is working on the implantation of homozygotes. Highly productive cows each give about 12,000 liters of milk per year. In their ovaries there are

several thousand cells, from which highly productive animals likewise could be born. But biologically a cow cannot calve more than five or six times during her entire active period. A technology has already been devised for taking an egg cell from a highly productive cow, fertilizing it with spermatozoa from a pure-breed bull and implanting the cell in the uterus of cows with low milk productivity. The effectiveness that we have obtained exceeds that in some other developed countries; the institute is already training specialists from NAPS [the National Agroindustrial Union] and from the Agricultural Academy.

A few words about the industrial production of vaccines. The Institute for General and Comparative Animal Pathology has developed a vaccine against Marek's disease, an ailment of chickens that used to result in losses of tens of millions of leva. We now not only meet all our needs for this vaccine, but also export significant quantities to the Soviet Union and the other socialist countries. The creators of the Marek vaccine have been awarded the Dimitrov Prize. A technology created for the production (comparatively cheaply and in large quantity) of (elimoklavin) is the result of close cooperation between the microbiology and physiology institutes. In its activity, it is identical with the very expensive bromo(kriptin) which we import for the treatment of Parkinsonism and some forms of endocrinopathy. Industrial production of elimoklavin is starting in Razgrad.

But these are the potentialities and achievements of biotechnologies at the present stage--based on classical microbiological and other research. The great future lies in the more energetic introduction of gene and cell engineering. With its help, we shall be able, for example, to make bacteria produce human interferon. Such a program has been devised by the Institute of Molecular Biology. It is not a matter of days or months, to be sure; it will take years to be implemented, but it will be of more revolutionizing importance, for it is constructed on a fundamentally new approach. There is also the great long-term problem of mastering the processes of photosynthesis to the extent that we can control and adopt them as factory technologies. These, of course, are visions of a more distant future, but as we create biotechnologies based on present-day achievements of science, we are mindful that, as an academy of sciences, we must also stimulate research with a more distant applied goal. Nitrogen fixation is such a question.

We now fertilize with nitrogen fertilizers--these are nitrates which in the soil turn into nitrites, pollute it, salinize it and reduce its productivity, as well as increasing the risk of a higher frequency of malignant diseases in humans. Nature has created micro-organismal bacteria which fix nitrogen. Unfortunately, they live in symbiosis only with leguminous plants, but through genetic engineering we can create nitrogen-fixing micro-organisms which live in symbiosis with other plants. A yet more distant goal is to introduce the gene of the nitrogen-fixing micro-organisms into the higher cultivated plants, and thus the plant itself can get from the air as much nitrogen as it needs. We have devised such a scientific program, but unfortunately have had to put a freeze on it due to the lack of sufficient funds.

The possibility of obtaining a growth hormone through genetic engineering is interesting, too. For humans, this will be of importance healthwise--everybody can be of normal height. But what if we begin to employ it in animal husbandry? Can you imagine how the production of protein and of meat will be increased? Sheep will become like cows, cows like elephants, chickens like turkeys, turkeys like ostriches etc. However amusing it may sound, this is not science fiction, but a feasible though somewhat remote goal. The possibilities in this area are very great.

Briefly, a word about the introduction of biotechnologies--a very difficult and vexatious process. Nobody who has not undertaken it in practice can know how harrowing it is. In order to facilitate this process, we call to the attention of our institutes that every research assignment must be brought to a conclusion--for a laboratory biotechnology is one thing, an industrial biotechnology is something else. We are now developing mainly laboratory techniques and trying to get them introduced into factories. We do not have a shop where semi-industrial and industrial biotechnologies can be created using our facilities. We are endeavoring, through contracts with the organizations that will introduce the biotechnologies, to hire their scientists and specialists as early as the research stage so that they will more willingly accept their introduction! And we have had definite successes.

Despite the difficulties, the introduction of biotechnologies into plants is easier than their application in agriculture. There, every one of the several hundred agroindustrial complexes in the country has to be contacted. In one place introduction of the technology works out well, elsewhere it does not. The complication comes both from their dispersion and from the difference in conditions and personnel training.

In principle, biotechnologies create small-tonnage but very valuable and science-intensive production. That is why they are especially promising; they do not require a great deal of raw materials and they yield a valuable and high-priced output. And that is precisely why they are a strategic area in the present and in the future. And this also explains the great role played by the Bulgarian Academy of Sciences in coordinating scientific research for our country.

6474
CSO: 2202/15

R & D ACCOMPLISHMENTS IN ELECTRONICS OUTLINED

Sofia VECHERNI NOVINI in Bulgarian 2 Jul 83 p 2

[Article by Nikolay Smirnov, Research Associate at the Institute for Solid State Physics at the Bulgarian Academy of Sciences: "A Valuable Contribution to Electonics"]

[Text] Electonics is making its way broadly and vigorously into everyday life, into production, space research, management of the national economy, and so on. Along with the development of microelectronics, a broad range of auxiliary servicing devices, representing the so-called sensors and actuators, is needed as an elementary basis for computer technology. These servicing devices, i.e., sensors (sensing devices) and actuators (implementing devices), are absolutely necessary for making contemporary complex automated computer systems for controlling processes, equipment, technologies, and so forth.

Having in mind the above considerations, research and development on semi-conducting sensors has gone on for several years in the section for physics-related problems in microelectronics of the Institute for Solid State Physics at the Bulgarian Academy of Sciences. The scientific team is led by corresponding member Yordan Kasabov. One development was the construction of magnetic elements. In 1982, theoretical and experimental research helped to create a bibasal, bipolar transistor whose output collector current changes under the influence of an outer magnetic field. It is protected by the intervention's patent.

This magnetic element was developed and put into use by means of the standard planar technology, which is widely used in the production of integrated circuits and discreet semiconducting elements. It is worth mentioning that world-wide experience shows that for the production of magnetic elements, magnetic diodes for example, silicon with a high specific resistance is used, and it is a costly material in short supply. But for the manufacture of our magnetic transistor, standard silicon chips, which are employed in the mass production of semiconducting transistors and diodes, are used.

The magnetic sensitivity of the element developed is ten times higher than the other galvanomagnetic apparatuses described in the literature. In addition, depending on the concrete practical use of the apparatus, it could be controlled according to the choice of electrical conditions of operation.

If a miniature ferromagnet, in the form of a cube with a 5 millimeter side, comes near to the magnetic transistor, under the influence of its magnetic field, depending on the direction of magnetic induction, the output collector voltage changes from several volts to zero and vice versa. In other words, this magnetic sensor can be used for installing magnetic buttons for non-contact input of information into computers or other devices. By pressing such a button, a miniature magnet brings the magnetic transistor closer and the output signal of the sensor enters the microprocessor or the actuating device.

The magnetic transistor's miniature size can be counted among its advantages--the volume of the magnetic part of the device is 0.2 x 0.2 x 0.15 millimeter. Thus the range of its applications is broadened significantly because it helps to transform more precisely the mechanical shifting of the various components into electrical signals.

The research carried out has demonstrated that a magnetic transistor could also be used for non-contact remote measurement of the direct or alternating current flow passing through a conductor by recording the electromagnetic field the latter creates.

An operative model for non-contact ignition in an internal-combustion engine was created, using a magnetic transistor. In this case the work of the breaker points in the distributor was replaced by breaking the magnetic field. The electric signal received from the magnetic transistor goes into an amplifying (stopalo), which controls a high voltage coil. In 1983 research has been oriented toward optimizing the parameters of the magnetic transistors by considerably increasing its magnetic sensitivity, output current, stability of operation.

By implementing the new sensor in practice on a national scale, it will be possible to increase the extent of mechanization and automation, to cut off the importation of such products. Some of the most important fields of application for magnetic transistors in the national economy are: automated industry, computer technology, robotics; the automobile industry--electronic ignition and control; machine building--determination of median and extreme positions in automated lathes, defectoscopy of products made of ferromagnetic materials such as pipes, rolled rails, and so forth; electrical engineering--non-collector, direct current, electric engines, microrelays, measuring instruments; geophysics and geological engineering--positional measuring elements in different indicators for mechanical shifting, seismographs, measuring geomagnetic fields.

[Photo caption: Device for non-contact ignition in an internal-combustion engine using a magnetic transistor]

12334
CSO: 2202/16

PROBLEMS, ACHIEVEMENTS OF DOMESTIC ISOTOPE PRODUCTION REVIEWED

Budapest HETI VILAGGAZDASAG in Hungarian 11 Jun 83 pp 37-39

[Article by Erika Zador: "Harmful Radiation--Isotope Production and Application"]

> [Text] The Isotope Institute of the Hungarian Academy of Sciences has every right to a standing as a research institute although, simultaneously, it is the exclusive producer and distributor of isotope products including those for export and import. However, because of a staff reduction affecting research institutes, it found itself in a difficult situation because compliance with the regulation would hinder the production of profitable materials which, in many cases, substitute for imports or can even be exported.

The Isotope Institute of the Hungarian Academy of Sciences is producing increasingly more of the radioactive materials indispensable for modern medical diagnostics. (Our article in this newspaper entitled "Isotopia" discusses in more detail the diagnostic methods which use radioactivity.) The users were satisfied with the quality until recently, but these days the complaints are on the increase. For instance, the physicians complain that, on pulling out the syringe containing the radioactive solution from the ampoule, drops are scattered, the careful cleanup of which is unnecessary work.

According to Laszlo Zsinka, radiochemist and technical deputy director of the institute, the trouble is caused by the rubber stoppers. While earlier, the ampoules were sealed with imported rubber stoppers of 4-mm thickness, today they are glad if they can get at all the 0.8-mm thick domestic products. But this solution definitely can not be final, on the one hand, because the work with radioactive products does not tolerate any kind of uncertainties and, on the other hand, because the quality of the product also can not be guaranteed with these stoppers. If they do not receive soon the import materials valued at a few hundred dollars, they have to stop production which replaces more than $100,000 in capitalist import for the diagnostic supplies used in vivo alone. Of course, they also have to give up the export, one of its most profitable shares. (The news came after our deadline that the institute is expected to receive the imported materials in the near future.)

Radioactive isotopes are used not only in medicine but also, increasingly, in industry. For instance, in most places, a radioactive isotope of iridium is used today to check welding. The iridium is irradiated in Swedish and Belgian atomic reactors of greater efficiency than the domestic one--for hard currency, of course--and the industrial radioactive sources are prepared at the Isotope Institute. Because it is not a manufacturing plant last year, the institute failed at first to get the 20-30,000 dollars needed for serial irradiation. But when it was found that because of lack of the necessary proofs of quality, a machine export worth many hundreds of thousands of dollars would fall through, they did get the money later.

Today, the question does not even arise whether there is need for radioactive preparations. Moreover, it is also obvious that there are preparations which can only be made in the user country. For instance, the isotopes with the short half-life desirable in medical diagnostics cannot even be imported in practice: they would decompose by the time they arrive. Isotopes with a long half-life, and preparations from them, are in general manufactured through a reasonable international division of labor. There are few places in the world where everything is handled. Most producers are involved in both, export and import.

It is more difficult to answer the question whether it is profitable to produce isotopes. The Isotope Institute spends 20-25 million forints of its annual budget on basic research. Its own earnings were about 115 million forints last year. More than half of this was derived from isotope production and the rest from contracts with industiral enterprises connected with the use of radioactive isotopes. In isotope production, the 60 million forints were produced by 80 people. This sounds beautiful but nevertheless, it cannot be stated that isotope production, in the present quantities, would be self-supporting. This, by the way, holds true also for the other isotope producers. Moreover, even the leading firm of the field, Amersham of Britain, does not survive without indirect state support in spite of the fact that it produces much larger quantities than does Hungary. For instance, the firm does pay for the use of the atomic reactor in Harwell, but not nearly enough to cover the amortization of the reactor. The installations for isotope production and processing are also so costly that they cannot be covered from the production. And the 80 people mentioned, in Hungary, are also not all who are involved because a significant part of the intellectual and material potential of the institute is backing them.

Isotope production would soon be exhausted without continual research (also including basic research) and technical development. It is not only that, in such a complex process, some unexpected error can always develop which cannot be eliminated by a technician no matter how well-trained because it definitely requires a research physicist. It is also that without the introduction of new products and continual improvement of the old ones, the venture itself would operate at losses within a short time because no one would buy the outdated products. Nevertheless, this research-development background cannot be maintained on the income from isotope production.

But, they maintain at the institute, the success of the domestic isotope products is guaranteed precisely by the complete chain of innovations--from

basic research to marketing--occurring in one place there. The production currently replaces a 1-million-dollar annual import. In addition, products valued at 120,000 dollars are exported. In the beginning, the institute strove to make products already on the market, but today it is also developing and making original products by utilizing the results of basic research and data from the literature. These are, for instance, the increasingly more widely used technetium products for in vivo examinations or, more recently, the radioactive iodine-labelled prostaglandins. The latter was started as basic research but its significance was recognized soon. It was also recognized that they can be used to achieve a prominent place also on a global scale. A renowned Swiss firm is already showing interest in the new product. The firm would gladly participate in its distribution. It deserves special mention that only a few months have elapsed between production and orders from abroad--according to members of the institute--as a result of the closed innovation cycle.

But the desired expansion of production meets with serious obstacles. As is generally known, the number of institutional appointments must be lowered, for the 7-percent rule is also valid for the Isotope Institute. But, when the leaders of the institute took note of this, they could not yet know that, as a result of developments during the past 2 years, the income from isotope production would increase by 30 percent, that is, work with them would also be profitable. However, this requires manpower. For instance, 10 people are needed just for the production of the already mentioned prostaglandins and other, iodine-labelled compounds. The possible regroupings have already been accomplished, and thus the problems cannot be solved in this manner, not only because, for instance, physicists, engineers or mechanics cannot be transferred to chemical preparative work totally unknown to them and requiring a high degree of specialized training, but also because it would be senseless to halt projects run in an excellent manner. Thereby they would not only destroy the successful, old research areas, but they would also not improve production by much.

In the opinion of Laszlo Zsinka, technical deputy director, a distinction should be made among the research institutes. The lowering of the number of appointments, he said, cannot be carried out mechanically or independently of the research trends of an institute. According to him, the solution would be to make the distribution of isotopes independent by establishing a daughter company with 25 employees. This would specialize the distribution of products brought from abroad to the users. Thereby the problem associated with fewer appointments at the institute would be lessened, and at the same time the daughter company would also be viable because it does not need the intellectual backing of the institute for its operation. The occasionally needed services of specialists would, of course, be continually provided by the institute.

In addition to problems with the number of personnel, isotope production must also face other problems, for instance, when equipment wears out. For instance, the intricate mechanical manipulators used to handle highly radioactive materials are already in such bad shape that they cannot be used to

recover the disintegrated radiation sources which are just collecting in a storage room and taking up already crowded space, while the country must buy cobalt from abroad.

The other, even more severe problem is the renewal of the reactor in Csilleberc. After having functioned impeccably for more than 25 years, it must be halted by 1985 at the latest, because it needs complete reconstruction. During the renewal period, not only those radioactive isotopes for which the domestic reactor has insufficient capacity, but all of them, will have to be irradiated abroad. The Isotope Institute is already conferring with institutes having atomic reactors in Dresden, Prague and Warsaw to have the necessary irradiations carried out there--not for free, of course. But the best solution would be the Seibersdorf reactor between Vienna and the Hungarian border. Namely, the safe isotope supply of the country cannot be satisfactorily solved with isotopes transported over long distances. For instance, it has happened that material irradiated in Dresden was not accepted by the airline because of an overload, or the plane was delayed by weather conditions. By the time the isotope arrives, it was not very useful; it decomposed. Transport by motor vehicle appears the safest but only over short distances of course, According to calculations, the extra irradiation abroad will cost 150-200,000 dollars yearly. In addition, during the reconstruction period, compounds currently produced in Hungary will also have to be imported--not for a pittance.

2473
CSO: 2502/42

CURRENT LAG IN ROBOT PRODUCTION, USE EXCEEDS 10 YEARS

Budapest HETI VILAGGAZDASAG in Hungarian No 26, 25 Jun 83 p 41

[Excerpts] In the framework of the national medium-term research and development target program for comprehensive industrial technical development, the Ministry of Industry and the National Technical Development Committee intend to allocate 300 million forints to support production and use of robots up to 1985. However, intentions and ideas are not operational robots, especially when a few "technical errors" creep in as early as the organizational stage. Those in charge of industrial policy considered the Gyongyos factory of the United Incandescent Works as the logical place to produce Hungarian robots in the early 1980's especially since the plant had been making the manipulators used in the production of TV picture tubes for some time. However, these development plans hit a snag when Incandescent's semiconductor factory in Gyongyos, along with its manipulators was incorporated in the Microelectronic Enterprise which was established early last year. Furthermore, this Enterprise, in view of its multitude of development tasks, was unwilling to undertake all around introduction of robots into industry; it volunteered only to work on one or two partial projects. The time and money thus lost is only partially compensated for by the fact that the association being formed in the Machine Tool Industry Work (Szerszamgepipari Muvek) is now competing to play the role of production basis of Hungarian robot engineering.

The decisive question is whether or not our industrial enterprises, in their quest for competitiveness, are willing and able to adopt this modern production technology. According to official statistics, Hungarian enterprises use a total of 30 robots at present; these devices they either fabricated themselves or purchased abroad. In March of this year the Ministry of Industry and the National Technical Development Committee announced a competition to the industrial enterprises. Said competition promises substantial government support for enterprises which use robots or manipulators. Altogether, 75 enterpises entered the competition. It is too soon to tell which of the plans submitted will be found acceptable. However, it is the well-founded opinion of many that few of the enterprises are geniunely interested in robotizing their production in view of the current economic situation and the redundant employment which prevails in many cases. This is a clear indication that the 10-15 year lag in this area will soon have a detrimental effect on the competitiveness of Hungarian industry as a whole.

CSO: 2502/44

BRIEFS

INTERNATIONAL ASTRONAUTICS CONGRESS--The 34th congress of the International Astronautics Federation will convene in Budapest from 10-15 October 1983. The meeting will be under the auspices of Hungary's Federation of Technical and Natural Science Associations and its Central Astronautics Division. Agenda will include space research, rocket engineering, space communications, medicine, biology and propagation of satellites as an educational tool. Attendance is expected from 36 nations. It is worth noting that of the 60 complex papers to be presented, nine will be given by Hungarians. Hungarian space lawyers have been participating in IAF colloquia since 1962. Hungary is a signator to six important international contracts which regulate space activity. [Budapest MUSZAKI ELET in Hungarian 26 May 83 p 16]

BIOCHEMISTS ON WESTERN SCHOLARSHIPS--Barely 500 persons a year are given the chance to familiarize themselves with the world's leading research and production sites, to conduct research under truly up-to-date conditions. Among those who recently had such an opportunity were the following: Janos Hajdu, scientific worker of the Institute of Enzymology of Szeged Biological Center of the Hungarian Academy of Science, spent 19 months in England investigating the structure of oligomer proteins as well as changes in the protein structure; within this he studied the allosteric transitions of glycogen-phosphorylase using the method of chemical cross binding. Dr Adam Kondorosi, scientific worker of the Institute of Genetics of the Szeged Biological Center, spent 14 months in the FRG investigating the molecular genetics responsible for symbiosis in Rhyzobium bacteria, Dr Andras Salgo, assistant professor at the Chhair of Biochemistry of Budapest Technical University, spent 12 months in Switzerland conducting research on grain enzymes, the structure and mechanism of wheat proteases. [Budapest MUSZAKI ELET in Hungarian 26 May 83 p 14]

CSO: 2502/45

SCIENTIFIC RESEARCH PLANS, PROGRAMS, PROBLEMS OUTLINED

Centrally Controlled Programs System

Warsaw RZECZPOSPOLITA in Polish 28-29 May 83 p 4

[An interview with Stanislaw Wolf, Director of the Institute of Nonferrous Metals of Silesian Polytechnic Institute, by Janusz Dembinski: "How Science Can Be Managed Efficiently"; date and placed not specified]

> [Text] An important factor in overcoming the nation's economic difficulties is widespread use of domestic technical thinking. To enable this, one should create conditions for maximum industry orientation towards invention and innovation. A correspondent of RZECZPOSPOLITA discussed this issue with Dr. Stanislaw Wolf, Director of the Institute of Nonferrous Metals, Silesian Polytechnic Institute.

[Question] Basic research and development programs in the national economy had been set forth years ago in the form of so-called government key and ministerial programs. How do you estimate the implementation of this system of research organization?

[Answer] While major successes were scored in implementing the research programs, certain limitations were also observed. They occurred in two areas: psychological and organizational. The former was due to the fact that in our country innovations in industry are mainly identified with the interests of the originator of the innovation, rather than with those of the economy and society in general. The other difficulty stems from the current system of organization (conventionally defined as consisting of research, development, and application), which failed to prove its efficacy. But so far no better, more adequate conception is to be seen among the solutions offered by the economic reform.

[Question] The system of centrally managed programs was aimed at ensuring for the government the control of proper utilization of the research and development facilities so as to implement work that is crucial for common national interests and utilize finances most effectively.

[Answer] Shortages of centrally controlled research and development programs resides in the fact that outlays on purchase of foreign knowhow and licenses were increased several times, while the sale of similar results obtained by national research facilities was in complete stagnation. At the same time, there was a shortage of original Polish machinery and equipment designs that would enable entry into foreign markets at appropriately high price levels.

I believe that the first step to be taken is to dismantle the monopoly of narrow groups of scientists or research units who determine the directions of research and establish the priorities and have held these positions for many years.

I doubt the value of maintaining the so-called concentration of research in different programs, which in practice I believe becomes deconcentration. In the present system of science management, the grouping of research in major government programs is often just an appearance, because in reality individual subject areas are developed by groups of specialists from areas that may be remote from those represented by the one that recommends it. An increased number of small programs with a specific purpose rather than government and similar programs will not in reality lead to deconcentration of research. In the future, I believe we should relinquish the administrative system of managing research potential. It seems that sufficient safeguards of scientific efficiency would be financing through banks or directly through industrial enterprises based on profitability. Research in basic science, on the other hand, should continue to be financed by the central government.

[Question] How would you justify your concept of giving a free hand to applied research?

[Answer] There is a variety of research problems that call for participation of specialists from different areas, which, under the current system of research organization, often have nothing in common with the head research organization. Improved management should occur through a long-term process, because organizational, as well as technical, progress should be adapted to the changing socioeconomic realities. One could even return to the elements of the old structure--namely, use the Committee for Science and Technology as a coordinator of all activities and especially as the basic source of expert opinion for banks and for the sponsors of prospective research activities where the principle of profitability could not be used as the main control.

Physics Research Conference, Plans

Lodz GLOS ROBOTNICZY in Polish 6 June 83 p 3

[Article by S.B.: "An International Meeting of Physicists at Lodz University: Basic Research. Improved Technological and Computer Engineering Processes"]

[Text] A four-day international working session of physicists concerned with the study of phenomena in so-called nonhomogenous systems opens today at Lodz University. This is a field of basic research which, among other things, is concerned with magnetic properties of thin films. The possibilities of applications of basic research results in new or improved technological processing, introduction of new solutions into computer technology, are also considered. For the purposes of research, for example, new scientific equipment is developed at the Institute of Physics of Lodz University, which is often then applied for other purposes (such as in industry and health care).

The session will be attended by scientists from York University (United Kingdom), Lyon I University (France), Kassel and Giessen Universities (FRG), Frascata Astrophysical Observatory (Italy), Sofia University, Safarik University, Koszyce, and Technical University of Copenhagen--all of whom the Institute of Physics cooperates with. The scope of this cooperation increases continuously, as the solid state physics department of the Institute of Physics,(Director Professor Dr. Leszek Wojtczak) is a research center of national and world renown.

On the meeting's agenda is a discussion of current projects, results and research plans for the near future. Much attention is given to results of comprehensive research into the properties of gadolinium (a variety of so-called rare earth elements). Studies of this material simultaneously at Giessen, Kassel and Lodz, revealed phenomena that are inexplicable on the basis of existing theory and require further elucidation. This research is associated with the potential of development of new alloys valuable for microelectronics. In a joint project with Lyon I University, Lodz physicists are conducting microscopic studies of various materials using methods developed by their French colleagues.

The meeting was organized by the Department of Solid State Physics, Institute of Physics, Lodz University.

9922
CSO: 2602/27

COMPUTER, MICROPROCESSOR DEVELOPMENTS, PROBLEMS DESCRIBED

Series Production of Microcomputers

Warsaw TRYBUNA LUDU in Polish 3 Mar 83 p 1

[Article by (PAP): "A Series of Microcomputers Has Started Moving"]

[Text] On 2 March, the Krakow Mera KFAP Measurement Apparatus Plant announced the start of a production series of high quality microcomputers. They are considerably smaller and 50 percent less expensive than the popular Odra computers; they may be used in enterprise management and in overseeing production as well as technological processes.

By the end of the year, the Krakow plant will manufacture 250 units of these microcomputers. The subassemblies which are installed in them come from the Soviet Union, Bulgaria and Hungary. The forced resignation from U.S. imports has in no way affected the quality of the microcomputers and has even made it possible to save more than $200,000.

Computer Center Operation

Krakow GAZETA KRAKOWA in Polish 8 Feb 83 p 3

[Article by Wojciech Klemiato: "A Computer With...References"]

[Text] The assistant manager is thinking over the following scene: a client, let us say a head bookkeeper, comes to ZETO [Main Center of Electronic Computer Equipment] and proposes that the firm handle their financial-cost bookkeeping or materials management or perhaps some other form of record keeping. Naturally, there can be no talk of refusing ("we aim to fulfill every request"); however, it would be a good idea if before making up his mind, the client would make certain with his colleagues, who use digital computers, whether such an undertaking is worthwhile and profitable.

The economic director of ZETO in Krakow, Wladyslaw Kapusta, formulates the matter as follows: "I am in favor of basing a firm's good name on its record of service. Let our clients speak for us."

Clients

Among the oldest ZETO clients (ZETO has been in existence for 17 years) are the Szadkowski Plants for whom the firm provides computerized materials management record keeping, computerized calculation of contract work wages and planning of a certain segment of production. Industry accounts for 30 percent of the clientele, who to a large extent entrust the computer with overseeing materials management and manufactured goods (among these are: Telpod and Famo). The situation is similar in the case of municipal management (MPK [Municipal Transportation Enterprise], PGM [expansion unknown], MPO [Municipal Sanitation Enterprise]). Businesses (10 percent of service) are mainly interested in financial operations and as in the case of the WZSR [Provincial Union of Agricultural Cooperatives] Samopomoc Chlopska, in commodity turnover.

There are also uncommon service requests. For example, the Institute for Meteorology and Water Management is introducing a system of protection against the threat of flooding; the Provincial Command of Citizens' Militia [KW MO] is recording the incidence of crime while the Polish Studies Institute at the Jagiellonian University has ordered a computer for analysis of literary texts.

However, the biggest client was the Krakow branch of NBP [Polish National Bank], who paid tens of millions of zlotys (at least 40 million in 1982) into the ZETO account every year for the daily computation of financial operations. We say "was" because it has placed into operation its own computer center and is gradually withdrawing its service orders. The Social Insurance Institutions [ZUS], which placed an order for a printout of annuity and pension statements (for 330,000 people!), is trying to fill in the gap which the bank is leaving ("we shall not make up for the loss because the bank constituted 40 percent of our service orders").

It cannot be said on the basis of order requests that ZETO and more precisely, the computer, controls the system of enterprise management. It aids people in simple, though work-consuming functions while it contributes to the making of operative decisions, let alone production planning only to an insignificant degree. In other words, the traditional methods of computing have, indeed, been replaced by a modern machine. This gives rise to the question of why work establishments do not reach for the computer in management organization?

There are many reasons for this according to the assistant manager of ZETO. One of them lies within the enterprises themselves. Computer science requires that documentation be set in order, at times before "enlisting" the computer to perform a larger workload. This makes it easier to preserve the status quo.

Prices

Perhaps it is the prices that deter potential clients? For materials management of an average sized plant, ZETO takes in between 35,000 to 40,000 zlotys per month; for a financial-cost system, 25,000 to 30,000 zlotys are paid while management of fixed assets does not exceed 10,000 zlotys. The punching of one

computer card has been valued at 2.30 zlotys (one-half zloty less than in other firms). Unfortunately, planning-program work and computer services have gone up 30 percent since January of last year.

In general, clients are not challenging the price list. Sometimes it comes down to negotiations and it is possible to take advantage of a discount as was the case with PLO-SA [Polish Security Bank, Ltd.] (5 percent for the daily computation of foreign exchange accounts). Starting in April of 1982, all services have been discounted 5 percent. This is due to reduced rates in turnover tax. Fortunately, the times are gone when it cost one-half million zlotys just for access to the system's documentation.

Computer Time

Two ODRA computers are used at ZETO (1 hour costs 3,200 zlotys) as well as RYAD-20 (1 hour--3,000 zlotys) and RYAD-32 (1 hour--4,100 zlotys). The utilization factor for ODRA has attained a 1.7 value owing to the application and use of multiprogramming. A "heavy work load" assigned to the machines has turned out to be advantageous both for the firm (the elimination of dead time) and for the clients (lower costs for services). On the other hand, the RYAD computers have not done as well because barely half of their capacity is used.

"And this is good," states Wladyslaw Kapusta, "because we can use the free capacity for the working out of systems and also bad because as a business, we are losing on their idleness."

Besides the above, there are seven MERA-300 minicomputers (1 hour--800 zlotys) in operation in Tarnow where it has been proven that this model is also suitable for servicing economic-management units.

Recession

It is increasingly difficult to get clients. There is still a lot of the unknown in the economy, therefore, potential clients prefer to wait out this period. Some are cancelling their service orders and are setting up branch computer centers.

The bank's leaving disrupted this year's structure of profitability. Its index will fall to a level of 10 percent (last year, the profitability level was 25 percent) and this will also have an effect on salaries. They are not all that sensational in this case-- 9,000 zlotys on the average. They are, admittedly, augmented by bonuses (for 1 million zlotys of profit, 100,000 zlotys are allocated for the wage fund; last year, 600,000 zlotys were paid in bonuses, however, work conditions are frequent deterrents (three shifts, working frequently on free Saturdays and the distant location of the computer centers).

The competition is not resting either, thus making it increasingly difficult to find maintenance men, especially electronics-automation specialists with a higher education. Obviously, there are also problems with spare parts, particularly, mechanical elements (the cause for illegible printouts) as well as disc and tape memories. They try to make do with very expensive reprocessing.

Interest in working out new systems has waned, even though the possibilities have not been exhausted while the firm's storehouse of information in this area is enormous. It is becoming more and more difficult to find a consultant for the particular programs since stability in economic management is still far removed.

"In spite of this, I do not fear for the firm's future," states the economic director, "because with a heavy computer workload, we can afford to play the market game with the competition."

Computer Center Operating Problems

Krakow GAZETA KRAKOWA in Polish 23 Mar 83 p 3

[Article by Krzysztof Cielenkiewicz: "What Is in Store for Krakow's CYFRONET?"]

[Text] Saturday, 19 March 1983--a day free from work. There is no one to be seen around the campus buildings of AGH [Academy of Mining and Metallurgy], UJ [Jagiellonian University], and AR [Agricultural Academy] which are located on Reymonta Street; there are no cars in the vicinity. A few hundred meters further, a line of vehicles stretches along the boulevard in the direction of Zakopane. It is the first day of the weekend.

It is 11 a.m. as I enter the computer room at CYBERA 70.

"We are working constantly, in three shifts every day, every night including holidays and even New Year's Eve," says the operator of electronic digital computers, Elzbieta Magiera.

I watch how four large assignments for UJ are being "computerized"; I can see on the monitor a line of those waiting for "input": the Academy of Economics, the Institute of Nuclear Physics, AGH. They are waiting and so are others.

"At the present time, we have already surpassed the limits of our capabilities despite working in three shifts. There is a waiting period of one and even two weeks for the results," says the director of Krakow's CYFRONET Community Computer Center, Eng Jerzy Kolendowski.

And because life does not tolerate idleness, a new phenomenon has sprung up in view of the Krakow Computer Center's overfilled capacity. When traveling abroad, scientific workers take along entire batches of their own commissioned assignments and those of their colleagues and do their computing there!

Computer Has Become a Tool

It is a significant aid in research work for many scientists, who have become used to "thinking through it." CYFRONET serves more than 3,000 people from Krakow colleges and institutions with its computers. Virtually everyone is making use of the computer services. It is easier to mention the fields which do not avail themselves of CYFRONET than to name a long list of those who use it, among whom physicists, chemists and economists stand out in number. The list also includes technicians and engineers from various fields as well as physicians and even press specialists and archeologists.

The computer has become an indispensable as for example, the typewriter. It is not easy to imagine our lives without the latter unless, of course, the Benedectine monks would return to our offices and institutes to laboriously copy hundreds of documents.

It is just as difficult to imagine modern science or its development and contact with the world without electronic digital computers. The lack of such centers as CYFRONET would lead to ignorance of the language of modern civilization; it would constitute a great injustice to our scientists and students who would use some sort of tribal language called "Polan" in their research--a language which would be used in a country without computers. This is the simplest way of understanding the sense and need for the existence of the center.

This gives rise to the following question:

Is the center indispensable for the entire scientific community in Krakow?

As a whole or separately? This question was answered for the first time 12 years ago at which time the dilemma was solved whether to allocate the acquired funds for the purchase of a large computer system or to divide them up among the various colleges. The decision was unanimous: the funds were used for the creation of a unit needed by everyone.

This consensus among Krakow scientists was the premise for the creation of CYFRONET which was officially called into being on 23 March 1973, therefore, exactly 10 years ago.

Subsequent work progressed quickly; the CYBER system was purchased and went into operation in 1975 and has continued to function without interruption to this very day.

The doubts which prevailed at the time as to whether this system would be necessary or fully utilized, have been dispersed in practice or rather by the work results of the center.

Life has also brought new problems. Currently, at a time of serious economic crisis, a new dilemma stands before Krakow scientists.

To Implement the Development of Center or To Allow for Its Downfall?

The current situation is such that the time-sharing CYBER computer system with 20 terminals placed in various Krakow colleges and institutes, which has been in operation for 8 years, can no longer accommodate the needs of the community.

On the other hand, the computer itself though capable of running for another dozen years or so is wearing out as a system; simply put, it is getting older. In addition, it is no longer being manufactured thus giving rise to problems with parts and service.

Maintaining the present state constitutes a slow death for the center. Growth requires funds, large funds--this should be stated outrightly. The expansion of the center, in accordance to the demand for its services, requires doubling the computer capacity to the year 1985, thus, the purchase of a new computer system. The entire cost of this operation would require approximately 400 million zlotys. Extended plans up to the year 1987 foresee the purchase of two additional systems whose cost would amount to approximately 800 million zlotys.

These are large sums. However, it is necessary to start thinking now about a strategy leading to the overall solution of the situation in which many scientists leave empty-handed from CYFRONET's doorstep.

During a 10-year period, the Krakow scientific community has adapted itself to the use of the existing, large computer system. This fact has profound consequences.

We Must Not Resign From Electronic Computer Technology

Passing over to other, less expensive means, such as microcomputers, which are very popular worldwide, will be difficult to implement for a long time. We do not have them but what is of significance is that the owners of microcomputers all over the world can hook them up to computer networks which contain enormous computing and memory capacities.

Of course, many individual problems may be implemented on personal computers. However, powerful equipment is indispensable for solving large amounts of basic scientific, technical and statistical problems. That is why, despite the inundation of world markets with microcomputers, computer systems such as CRAY, AMDAHL, CYBER 200 and others continue to be produced and sold in great numbers. Large computers assure the implementation of major computations, the accumulation of vast and increasingly more expensive software and the storage of huge amounts of data. They are...

Pillars of Every Computer Network

...Whose other end are microcomputers (I am anticipating that someday we will have them) which are installed in workshops, laboratories or homes. They serve locally and should the need arise, they can be hooked up to a computer network by means of ordinary telephone equipment.

Elements which allow for the implementation of such a concept already do exist in Krakow. There is a central computer in operation in CYFRONET. To be sure, the network is as yet poorly developed--but it does exist. A small amount of microcomputers are also beginning to appear. There will be increasingly more of them because that is the direction in which the world is going and we are not an island. Future consumers of microcomputers will want to have access to a large system.

Thus, the question continues to reappear: Will we have this system and will CYFRONET obtain the necessary means for development?

A journalist cannot answer this question. Again, as was the case 12 years ago, the future of CYFRONET and of the scientific community will depend in large measure on the general consensus in this matter of the Krakow scientific community.

Computer Programming Method, System

Warsaw WIADOMOSCI ELEKTROTECHNICZNE in Polish No 12, 15 Oct 82 p 375

[Introduction by the editor]

[Text] We are introducing to WIADOMOSCI ELEKTROTECHNICZNE a new and permanent section entitled, "Programs."

In this section, we will publish information obtained from individuals and institutions about programs developed on EMC [Electronic Digital Computers] in the field of electrotechnology.

The presented material has an informational-promotional character. It serves to disseminate information about EMC programs, which already exist in the country in the field of electrotechnology, in order to give them a wider range of application, establish working contact with persons who are involved in solving similar problems and to avoid the possible repetition or duplication of work.

We turn to the authors of EMC programs which deal with a wide variety of computerized computations in the area of design planning, measurement, development and testing of products, equipment and electrotechnical systems ans we also turn to various institutions that have such programs to send in to our editorial staff informational bulletins for our "Programs" section.

The scope of information contained in the bulletin about computer programs should include data given in sections 2-16 of the table presented below.

The bulletins are treated as authored material for which an author's fee will be paid on the basis of generally accepted principles.

[Table on following page]

Table 1. Computer Programs

1.	Numeracja programu wg WE 1	I	II	III
2	Nazwa (temat) programu 2	ELAN	SMOD. Synteza układu regulacji oraz badanie wrażliwości parametrycznej silnika bocznikowego (obcowzbudnego) prądu stałego 3	Model niezawodnościowy przemysłowej sieci elektroenergetycznej 4
3	Dziedzina zastosowania 5	Transformatory 6	Układy napędowe prądu stałego z silnikami bocznikowymi (obcowzbudnymi) do mocy 400 kW 7	Wyznaczanie kosztów strat gospodarczych w zakładach przemysłowych o ciągłych procesach produkcyjnych wywołanych zawodną pracą sieci elektroenergetycznych zakładów 8
4	Język 9	Fortran 1900 10	Fortran — wersja standardowa 11	Algol 1900
5	Typ EMC, system operacyjny 12	ODRA 1305	CYBER 72, ODRA-1305	ODRA 1305
6	Minimalna wielkość pamięci operacyjnej (PAO) 13	36 kb	14,3 kb	32 kb
7	Nośnik 14	Taśma magnetyczna 15	Taśma magnetyczna	Taśma magnetyczna
8	Średni czas obliczeń, w min 16	3	1	ok. 2 godz. (dla sieci elektroenergetycznej składającej się z 80 elementów, procesu produkcyjnego składającego się z 20 urządzeń produkcyjnych i 20 magazynów czynnika technologicznego) 17
9	Maksymalne wymiary zadania programu 18	—	—	Dowolna sieć elektromagnetyczna składająca się co najwyżej z 500 elementów podstawowych, które tworzą co najwyżej 100 układów podstawowych. Maksymalna liczba torów równoległych w układzie podstawowym wynosi 5 19
10	Powiązanie programu z systemem, innymi programami itp. 20	Wersja ODRA 1305 z systemem operacyjnym GEORGE-2 21	Wersja CYBER-72 z systemem SCOPE 3.4.4, Wersja ODRA-1305 z systemem GEORGE-3 22	
11	Forma wejścia 23	Karty perforowane 24	Karty perforowane	Karty perforowane
12	Forma wyjścia 25	Tabulogramy 26 27	Tabulogramy, wykresy na drukarce wierszowej	Tabulogramy
13	Data wykonania 28	październik 1980 29	czerwiec 1981 30	1979
14	Instytucja (adres, telefon) 31	Samodzielny Oddział Transformatorów ITC Łódź, Ul. Aleksandrowska 93, tel. 52-60-41 32	Politechnika Krakowska im. T. Kościuszki. Instytut Elektrotechniki i Elektroniki. Zakład Teorii Obwodów i Pomiarów Elektrycznych. 31-155 Kraków ul. Warszawska 24 tel. 33-03-00 wew. 614, 615 33	Instytut Elektroenergetyki Politechniki Łódzkiej ul. Gdańska 176/78 Łódź tel. 611-93 34
15	Autorzy programu 35	mgr inż. Alina Fronc 36	mgr inż. A. Szewczyk	mgr inż. J. Wiśniewski, dr inż. J. Dąbrowski, dr inż. W. Przanowski 37
16	Krótki opis programu 38	Program oblicza: — wartość przepięć, wytrzymałość oraz współczynniki bezpieczeństwa dla izolacji wzdłużnej uzwojeń transformatorów w oparciu o metody Morisa i Werbera-Hastermana — pojemności wzdłużne i poprzeczne cewek badanego uzwojenia. Dane wejściowe: dane konstrukcyjne transformatora. Istnieje także możliwość dokonywania obliczeń na podstawie wczytanych do programu uprzednio policzonych wartości pojemności. 39	Dobór parametrów zasilania i regulacji napędu przekształtnikowego prądu stałego z silnikiem bocznikowym (obcowzbudnym). Dane wyjściowe: wielkości znamionowe silnika (napięcie, moc, prąd, prędkość obrotowa, przeciążalność, sprawność, moment bezwładności, moment obciążenia, dopuszczalny zakres regulacji prędkości obrotowej, dopuszczalny zakres prądu w fazie rozruchu, prędkości w stanie ustalonym, kąt graniczny wysterowania przekształtnika, maksymalne spodziewane odchylenia parametrów obwodu głównego od wielkości wynikających z danych znamionowych). Program oblicza wymagane parametry transformatora, układu przekształtnikowego (przy założeniu, że jest to tyrystorowy mostek pełnosterowany), parametry obwodu prądu wyprostowanego, parametry i nastawy układu regulacji (regulatora prądu typu PI oraz regulatora prędkości typu P z nasyceniem). 40	Wykorzystano symulacyjną metodę odwzorowania pracy przemysłowej sieci zasilającej oraz ciągłego procesu produkcyjnego. Program oblicza: — koszty strat gospodarczych spowodowanych zawodnością przemysłowej sieci elektroenergetycznej bezpośrednio po ich wystąpieniu, — kolejny odwzorowany rok pracy procesu produkcyjnego i odpowiadające mu koszty strat gospodarczych spowodowanych zawodnością przemysłowej sieci elektroenergetycznej, rok w którym roczne koszty strat uległy ustaleniu oraz ustaloną wartość oczekiwaną kosztów strat gospodarczych spowodowanych zawodnością przemysłowej sieci elektroenergetycznej. 41

[Key on following page]

Key:

1. Program number according to WIADOMOSCI ELEKTROTECHNICZNE.
2. Name (subject) of program.
3. SMOD. Synthesis of control system as well as study of parametric sensitivity of shunt motor (separately excited) of direct current.
4. Reliable model of industrial power network.
5. Field of application.
6. Transformers
7. Power transmission system of direct current with shunt motors (separately excited) with a power output of up to 400 kw.
8. Determining the amount of economic losses in industrial plants resulting from continuous production processes caused by the unreliable functioning of plant electrical power networks.
9. Computer language.
10. Fortran 1900 [problem oriented computer language].
11. Fortran--standard version.
12. Electronic Digital Computer [EMC] type, operating system.
13. Minimum capacity of operating memory (PAO).
14. Medium.
15. Magnetic tape.
16. Average time of computations in minutes.
17. Approximately 2 hours (for power network composed of 80 elements of the production process made up of 20 production installations and 20 stacks of the technological factor).
18. Maximum dimensions of program task.
19. Arbitrary power network composed of at the most 500 basic elements which form at the most 100 basic systems. The maximum number of parallel paths in the basic system is five.
20. Connection of program to a system or other programs, etc.
21. ODRA 1305 version with the GEORGE-2 operating system.
22. CYBER-72 version with the SCOPE 3.4.4 system, ODRA-1305 version with GEORGE-3 system.
23. Form of input.
24. Punched card.
25. Form of output.
26. Tabulations.
27. Tabulations, graphs on line printer.
28. Date of execution.
29. October 1980.
30. June 1981.
31. Institute (address, telephone).
32. Independent Division of ITC Transformers, Lodz [city], Aleksandrowska Street 93, phone 52-60-41.
33. Krakow Institute of Technology named after T. Kosciuszko, the Institute of Electrotechnology and Electronics, Department of Electrical Circuits and Measurements Theory; 31-155 Krakow, Warszawska Street 24, phone 33-03-00 extension 614, 615.
34. Institute of Electrical Power at the Lodz Institute of Technology, Gdanska Street 176/78, Lodz [city], phone 611-93.

[Key continued on following page]

35. Program authors.
36. Alina Fronc, Master of Engineering.
37. J. Wisniewski, Master of Engineering; J. Dabrowski, Doctor of Engineering; W. Przanowski, Doctor of Engineering.
38. Brief description of program.
39. The program computes: the value of overvoltage, resistance and safety cofactors for longitudinal insulation in transformer windings on the basis of Moris' and Werber-Hasterman's methods as well as longitudinal and lateral capacitance of the tested winding coils. Input data: transformer's structural data. There is also the possibility of performing computations on the basis of previously computed dimensional values read into the program.
40. Selection of the parameters of power supply and control of a direct current static converter with a shunt motor (separately excited). Output data: rated quantity of motor (voltage, power output, rotational speed, overload capacity, efficiency, moment of inertia, load torque, admissible regulating range of rotational speed, admissible range of current in the starting phase, speed in a steady state, limiting angle of converter control, maximum expected parameter deviations of the main circuit from the quantities resulting from data rating). The program computes the required parameters of the transformer and of the converter system (on the assumption that this is a silicon controlled rectifier bridge [tyrystorowy mostek] as well as the parameters of the rectified current circuit and the parameters and settings of the regulating system (type PI current regulator and type P speed regulator with saturation [nasycenie]).

41. The simulative method of mapping the industrial action of the power supply network as well as of the continuous process of production was used. The program computes:

    --the cost of economic losses caused by the unreliability of the industrial, electrical power network directly following their [losses] occurrence;

    --the next projected year of work of the production process and the corresponding cost of economic losses caused by the unreliability of the industrial electrical power network as well as the year in which the annual cost of losses was established; the program also computes the set, anticipated value of the cost of economic losses caused by the unreliability of the industrial electrical power network.

Microprocessor Development, Production

Warsaw ZYCIE WARSZAWY in Polish 30 Apr-1 May 83 p 3

[Article by Bozena Kastory: "A Chance for the Microprocessor"]

[Text] The government Presidium is deliberating over the future of microelectronics, the Sejm Industrial Commission is asking for funds for this purpose and directors of various firms are seeking confidential information. What is this microprocessor? The object of disputes and controversy, the hero of press polemics does not wait for a decision to fall but wins the title of "Master of

Technology" for the team of scientists and engineers from the Institute of Electronic Technology of the Scientific-Production Center of Semiconductors and the TEWA Semiconductor Plant in Warsaw.

This is at the same time something about which to be happy and sad. Happy that there is, after all, a Polish microprocessor; that it has come about despite problems with technical installations, funds and despite halted capital investments. This is a device which is nearly the most complex from among those which man is capable of producing and without a doubt, the most logically complex system which is currently produced in our country.

On the other hand, the fact that the level of the public's knowledge about the benefits of the microprocessor is near zero is cause for worry.

In France, 5-year-old school children are learning how to use microcomputers, whose central unit is the microprocessor. In Poland, after several press publications on this subject, the telephones started ringing with the following question: What is it used for?

The benefits of the microprocessor will depend on two factors: the amount of microprocessor systems available on the market and the understanding that these are devices without which we will not be up-to-date. Without this silicon chip with a several millimeter edge, which can become the brain of technical equipment, there would be no revolution in microelectronics. This tiny part can be programmed to operate a satellite as well as a wrist watch, a copper plant and the tabulation of automatic bank accounts. The microprocessor has its uses in the anticollision warning system for ships, in monitoring and measuring systems and devices and it can also control technological processes, Such an assist to the human mind can free an individual from repetitious and routine tasks and can also implement tasks of such complexity that it would be impossible for one person to carry out.

The microprocessor is made up of integrated circuits with each one composed of tens of thousands of elements. The growing number of these elements gives rise to increased information processing capacities, thus increasing the number of possibilities in which the microprocessor can be used.

The smaller the microprocessor, the easier it is to install it in a device such as an automobile engine or medical equipment. Thought is already being given in the world to such an unusual application of the microprocessor as controlling the processes within a living cell. There is even a name for such a microprocessor--biochip (chip meaning a silicon chip with an integrated circuit).

However, because it is so small, the designing and construction of a microprocessor is extremely difficult. Thousands of various elements have to be packed into a chip which has, for example, a 5-millimeter edge; the particular groups of atoms have to be arranged in such a way that their properties will replace vacuum tubes and transistors. Such devices require appropriate equipment, a computer assisted systems design and a program for the computer.

How did the award winning team, headed by Prof Andrzej Kobus and represented by the following, manage: Dr Andrzej Owczarek, Dr Andrzej Rosinski, Eng Zbigniew Krzyzanowski, Eng Jan Lysko, Eng Krzysztof Papiez,

Eng Maciej Pawlukiewicz, Wlodzimierz Tabaczynski, Eng Janusz Taff and Eng Lech Dobrzanski? I have written that the team was "represented" by the above-mentioned because that is what the awardees requested. In working out a device such as the microprocessor, the cooperating team is made up of specialists from various fields: designers-logisticians, topography designers, technologists, surveyors and others. Their contribution to the creation of a common piece of work is immeasurable. However, the "Master of Technology" award rules and regulations require that the number of cowinners be limited to at the most 10. However, life does not confine itself to rules and regulations and is demanding that at least three more persons be named: Eng Jan Koszur, Eng Maciej Chachulski and Eng Wiktor Kuncewicz.

"The result of their work of several years," according to Prof Bohdan Paszkowski, electronics engineer and active member of PAN [Polish Academy of Sciences] whose opinion I read in the complex documentation for the contest, "which is the microprocessor or in other words the central unit of MCY 7880 which constitutes the Institute of Electronic Technology at the Scientific-Production Semiconductor Center's own development. In this system, total systems and program comparability with the INTEL 8080 A microprocessor was achieved. The domestic version is improved as a result of using more advanced technology, thus making it possible to reduce the system's surface area by approximately 40 percent and to increase its speed."

How did the designing and construction of the microprocessor proceed?

First of all, it was necessary to execute a detailed electrical diagram of the system consisting of nearly 5,000 transistors. Then we had to test this system by using a specially prepared simulated program as well as prepare logical documentation containing detailed electrical diagrams, a description of the system's logical construction and the principle on which it works.

This project was begun in 1979. In the beginning of 1980, the next phase of work was started--designing the system's topography on a scale of 1,000:1, thus 1,000 times larger than the proposed microprocessor. The design drawing alone took up 20 sheets, 1,000 by 900 millimeters in size, while the amount of data describing the graphic design exceeded 200,000. These data were included in the memory of the design system whereafter the first design version of the system was executed. The first production flowline batch of the microprocessor was obtained during the third quarter of 1981. However, the first attempts produced negative results; there were errors in the design and it was necessary to find them. This turned out to be an extremely difficult task because it required that additional methods of locating the errors be worked out. These error finding methods consisted of designing and setting in motion designs which would check the particular segments of the system one by one.

After eliminating the errors and improving the production technology, the prototype series of 400 systems, which were designated for quality testing, were produced in the third quarter of 1982. It turned out that the executed microprocessor has very favorable parameters, particularly high speed functioning.

How does the Polish microprocessor compare to those produced in the world?

Up to now, 30-40 types of microprocessor systems have been developed. In the opinion of Prof Cezar Ambroziak, one of the creators of the first integrated circuits in the world and at the same time director of the Institute of Electronic Technology [ITE], the microprocessor developed at ITE is chronologically among the top 10. It is one of the most widely known in the world and was developed with the use of advanced technology and has very extensive software. Owing to this, it can be applied to the solving of various problems even in such far removed fields as agriculture, industry and medicine.

The production of the MCY 7880 microprocessor was first begun in the laboratories of the Institute of Electronic Technology in December 1982 and then in the TEWA semiconductor factory.

"For the manufacturer's plant," writes Prof Krzysztof Badzmirowski, "the microprocessor is proof of mastery in designing and producing a highly complex class of integrated circuit systems. The assessment of the entire scope of benefits, which will come about as a result of beginning the production of microprocessors, is also very complex. The effects of using the microprocessor will be noticeable not only directly in industry but also in areas of the economy far removed from industry."

For the time being, the plan for 1983 foresees the production of 15,000 microprocessor systems and 40,000 of them for 1984 at a cost of 1,600 to 2,000 zlotys per unit. They are being purchased by the former MERA [Automation and Measuring Apparatus Industry Association] association, by branches of the Polish Academy of Sciences as well as by design and construction agencies of large enterprises. Specialists from GDR and Czechoslovakia are interested in it. We are the number two country among CEMA nations right behind the Soviet Union in the production of this type of microprocessor.

I would also like to make a few side comments. If we already have our own domestically produced microcomputer, which for the time being is produced in small quantities, it would probably be advisable to think about developing a program of introducing microelectronics into the economy whereby it could be computed precisely where it should be used primarily. I have conducted many discussions with the directors of various institutes whose primary interest is electronics, with computer scientists and management specialists. No one was able to tell me on what basis the assessment of the advantages issuing forth from electronics in the economy will be made, in which the market is the producer's market and not that of the consumer. Industrial plants do not have to produce better quality in order to sell everything. Practically speaking, no matter what they produce they do not have problems in selling the product. Why should some factory install microprocessors in automobile engines for better control of fuel consumption when it will sell everything anyway several years in advance of prepayments. It would seem that we should begin from such an assessment of the economic advantages of microprocessors and from a program of action since no mechanisms exist which would induce the use of microelectronics in industry by themselves.

In the second place, a system of training those people who are to introduce the microprocessors ought to be developed.

Third, a plan of reaching the imagination of microelectronic consumers is necessary. As far as I know, no such program exists.

And yet, there is so much to know about the advantages of microprocessors. Last year, a record amount of microprocessors was sold worldwide for personal use, for offices, libraries, as Christmas presents, for robots, automatic equipment, machines, for design equipment, etc. We do not feel their lack because we do not realize how useful they can be.

I also feel that the lack of knowledge which has existed until now in our society, about the advantage of microelectronics indicates a certain lack of skill on the part of the community of electronic engineers in paving their way for access to the awareness of the authorities, the technical cadres of enterprises and the total population of intelligent people.

After all, the microprocessor will do its share if we reach out our hands for it. We must move those hands thereby reaching the mind.

9853
CSO: 2602/22

DEVELOPMENT OF SPACE, AVIATION MEDICINE OUTLINED

Warsaw ZYCIE WARSZAWY in Polish 27 Jun 83 p 3

[Interview by Bozena Kastory: "For Earth From Space"]

[Text] To mark the fifth anniversary of Col Miroslaw Hermaszewski's space flight, ZYCIE WARSZAWY interviewed Professor Stanislaw Baranski, commander-in-chief of the Military Aviation Medicine Institute.

[Question] Would you agree, Professor Baranski, that there is a perceptible decline in nonprofessional interest in space flights and research? It is a far cry from the euphoric response from the time when the Soviet Sputnik first circled the earth and the U.S. Apollo spacecraft first landed on the moon, or even from what we experienced 5 years ago when the Soviet spacecraft carried the first Pole, Col Miroslaw Hermaszewski, into space.

Would you agree with this observation and, if so, how would you account for this decline of interest in space travel?

[Answer] Your observation is quite correct. The general public is little interested in what happens in the extraterrestrial space because they have enough worries to deal with in their daily life. Space is, however, the talk and work of scientific circles, of interest among people who are aware of what was achieved by getting spacecraft off earth orbit and what could be achieved in the future. Besides, part of the public clings to the mistaken notion that space research consumed enormous resources, contributing to our current economic difficulties. The truth is that our input was very modest indeed, thanks to Poland's participation in the "Interspace" international space program. During Col Hermaszewski's flight, we financed merely experiments designed in Polish labs. On the other hand, there are still very few people who are conscious of the enormous opportunities, including economic opportunities, which are opened to us due to space research. These opportunities are obvious to physicists concerned with remote sensing, communications, people dealing with space medicine.

[Question] You consider the declining interest in space research to be an outcome of our difficult economic situation. However, it is not specific to

Poland but is reported from other countries as well. In my opinion, it might be attributed to a certain deficiency in our imagination. We find it easy to concentrate on things which are close at hand, within our immediate reach, beneath our feet, on which we are treading. What is far away, beyond the insulating layer of terrestrial blue, tends to be of less appeal. The earth is where we belong and terrestrial gravity seems to affect our reasoning as well as our bodies.

[Answer] You are right there but there is also another reason. What used to evade our cognition and be novel, has already been penetrated. We know what is there for us on the moon. The space surrounding the earth seems to hold few surprises for us for we amassed a considerable amount of information. You mentioned Armstrong's first landing on the moon. There was hardly a person asleep that night when we all waited to see what was going to happen, what sort of surface it was he was about to put his foot on. By now this is common knowledge. Since then many people actually have held moon rocks in their hands. We know what it is like. What was a novelty is well known, and perhaps it is why space lost somewhat in its appeal.

I presume, man's landing on Mars would offer another traumatic experience. There is also a chance that we might discover life outside earth. After all, why not? A Mars expedition would surely reawaken general interest in space.

[Question] Professor Baranski, what have you learned owing to space travel?

[Answer] From the point of view of medicine, we learned quite a few things. For instance, we learned that the condition of weightlessness was not as dangerous to man as had once been assumed. People were afraid that man's sojourn in the space where normal gravity laws are suspended might have grave consequences. We experimented with weightlessness on earth under simulated conditions; for instance, by immersing a man in liquid, the specific gravity of which was close to the specific gravity of the human body. His alimentary tract, digestion processes, metabolism, the behavior of muscles, were studied under these simulated conditions to check whether they were not affected to the extent making it possible for man to exist outside earth. We were afraid that the condition of weightlessness would upset the circulatory system. Now we know that these responses could be modified, controlled.

[Question] Is it not amazing that man, who originated on the earth and evolved all his responses and mechanisms to adjust to the terrestrial environment, is doing well in an environment that is completely alien to him--in the condition of weightlessness?

[Answer] It is technology that helps him to survive. Without technology, the adjustment of man's circulatory system to the condition of weightlessness would be difficult indeed, and his readjustment to gravity on his return would be even more so. However, man had an idea to construct, for instance, subatmospheric pressure pants which due to the subatmospheric pressure transfer down that portion of blood that was shifted to the upper part of the body as a result of weightlessness. Thus, a normal circulation is maintained despite

the lack of gravity. On the other hand, to make it possible for an astronaut to return to the earth and readjust to the earthly conditions, he undergoes physical training during flight. Attempts were also made to simul-te gravity, and so on.

[Question] So it took some mental effort to abolish weightlessness...

[Answer] Technology is a tool, making adjustment possible.

[Question] It is not only weightlessness that makes it necessary to protect the human organism in space...

[Answer] Space radiation is another menace to man, acting as a barrier to space flight. Man can, however, forecast and precalculate an exposure to radiation and pass those obstacles around in his flight. That is why the flight dates and paths are planned in advance to avoid serious risks.

[Question] Using the circumstance that radiation is neither universal nor uniform ...

[Answer] Naturally. There are zones of intensified radiation that should be avoided. Radiation doses to which an astronaut is exposed during his flight are not dangerous to the human organism. Attempts were also made to create electrostatic fields around space stations to deflect radiation. I believe that this obstacle to space travel will be eventually overcome and space radiation will stop being a barrier to flights.

[Question] My own geocentric attitude makes me pose another question: To what use can these discoveries and research be put to benefit those of us who remain on earth--that is, to benefit me, my neighbors and the readers of this periodical? What difference does it make to us that today it is easier for man to live in space because the condition of weightlessness is no longer dangerous and space radiation can be counteracted?

[Answer] I will limit myself to the medical aspects, since medicine is my field. Space medicine makes it possible to study space from biological and medical aspects. Then, to estimate man's possibilities of adjustment to these extraordinary conditions, and then to devise technical means which later can be used on earth.

Let me consider the final stage. How can space medicine contribute to man's wellbeing on earth? During Col Hermanowski's flight three experiments were carried out. To give one instance, an electric taste-meter was designed to measure a sense of taste and whether and how it was modified in the extraterrestrial conditions. The instrument is now used in terrestrial medicine for diagnostic testing. The devise is quite simple and I am not going to pause to describe it. However, it seems worthwhile to dwell in some detail on two other instruments designed by the Military Aviation Medicine Institute to measure the operative condition of an organism under changed environmental conditions. One of these is the so-called "cardio-leader." By emitting certain

pulses, this instrument helps to stimulate an astronaut's effort during his physical exercises. If training is too intense, the astronaut is warned by a signal to slow down; if he is saving his effort too much, he is prompted by the apparatus to intensify his workout.

The condition of the organism on the return on the earth is controlled by an instrument called "physiotest-1." In this case, heart beats and breathing rhythm directly control the training apparatus by adjusting the speed of the running path and modifying the load of a training bicycle. During these exercises changes of parameters essential for the condition of the organism are recorded. Both the cardio-leader and physiotest-1 are used in sports medicine and aviation medicine and are also adopted in physical therapy. After they are perfected, physiotest-1 and physiotest-2 will be used in the space stations. On earth, they are of service in the rehabilitation training after prolonged medication, rehabilitation after leg and arm fractures and in diseases of the circulatory system. With their use, it is possible to design a safe rehabilitation program for every individual case.

[Question] Polish space medicine has enjoyed high reputation around the world. Do you expect that a cut in expenditure might result in losing this position?

[Answer] There is no way we can lag behind. Once we cease participating in the international program, we are rolled out and in several years would be at a loss to recover our place. Last year, I participated at a UN conference and witnessed an immense interest in space medicine on the part of developing nations. Placed as we are in the middle of Europe, we cannot afford to lag behind other countries, if for no other reason, because space technology is later used on earth.

12359
CSO: 2602/29

COSMONAUT COMMENTS ON SPACE RESEARCH, DEVELOPMENT

Warsaw GROMAD - ROLNIK POLSKI in Polish 28 Jun 83 p 3

[Interview by W. Borsuk: "About Cosmos And Earth"]

> [Text] The calendar reminds us: On 27 June 1978, an international crew made up of Piotr Klimuk and Miroslaw Hermaszewski was launched aboard the ship "Soyuz 30". So begins an interview with Colonel Miroslaw Hermaszewski on the fifth anniversary of his flight. The fortunate conclusion of the flight occurred on 5 July. What is our first cosmonaut doing today?

We find him in the National Air Defense Forces where he continues to serve. He answers:

"I am a pilot and I fly. I work on strengthening the air defenses of our country. I also am involved in social activity; the problems of young adults also interest me. I cooperate in various research efforts dedicated to the peaceful exploitation of space. I am also very enthusiastic about astronomy and astronautics. To be sure, I maintain close contacts with my cosmonaut friends; recently, I saw them in Moscow. I spend my free time, which I have little of, in my allotted garden plot.

[Question] Colonel, let us return to the anniversary. After 5 years, what do you remember most about the historic flight?

[Answer] After the passage of this time, I evaluate my great space adventure somewhat differently, even if my experiences remain indelible. After all, it was a great event which I have to examine personally, but still more extensively. I see the continued progress of space research from the perspective of the several years. I am conscious of the weight of experiments which we conducted. They are the result of the serious contributi!ns of even Polish researchers, who represented many fields of scientific learning.

[Question] Maybe a few particulars. What is valuable for our daily lives as a result of this flight?

[Answer] The results of our space experiments assist medicine, geography and technology. They were the subject of research efforts which continue even today. Their results have had particular applications, among others, in geodesics, cartography, agriculture and forestry. Shortly after the flight, in which I played a role, we produced a current map showing the mineral resources of Poland. If we had wanted to make such a map from the air, it would have taken many years. With a satellite we can research the state of the oceans and the degree to which the harvests are ripening. Technological experiments, which were developed in Syrena experiment during our flight, permit us to keep materials which can be processed only in a state of weightlessness. Much good can result for earth's inhabitants because of research conducted in space and from space.

[Question] There have been several additional space flights since 1978. Has anything new resulted from them?

[Answer] Our flight was one element of the joint intercosmos program. Each state participating in the program prepares experiments with Soviet scientists for execution in space. Everything was tied together by common traits: they were flights and experiments of a peaceful nature and simultaneously symbolic. The countries participating in this program have great scientific and economic potential, but it would be more difficult to perform these research efforts on their own because the experiments are very expensive. Joint efforts result in very great achievements.

[Question] Do you remember the flight of the Columbia?

[Answer] In those years, we admired the launches of the U.S. shuttle "Columbia" which was a great technological accomplishment. But we have to keep in mind that a great part of those flights did not serve the interests of peace. The shuttle is chiefly to be used for military goals. What really disturbs one is that there is a great possibility of the militarization of space. In the regions of outer space one can conduct combat operations; from space, one can conduct intelligence operations; and one can attack strategic targets on earth. To be sure, the U.S. shuttle can be used to conduct reconnaissance; laser weapons can be installed on it; the flights of aircraft can be monitored even from several hundred kilometers above the earth. Western militarists attach great hopes to the shuttle inasmuch as they affirm that it allows them the opportunity to control every nook and crany of the globe, as well as the chance to influence events by using the most terrifying weapon - the nuclear weapon.

While in space, I saw our whole planet hanging in space. I know how much good the experiments conducted in space and from space can bring the inhabitants of earth. I also know that they can serve nonpeaceful purposes. Despite the treaty concluded in January 1967 simultaneously in Moscow, London and Washington and which was later signed by 80 countries, a treaty on the peaceful utilization of outer space, the utilization of the cosmos for military purposes has entered its practice phase. The flights of the American shuttle "Columbia" attest to this. A central military command-post for activities in outer space has even been set up in the state of Colorado.

For this reason, the protest against the growing threat of war has united people of different political convictions, different confessions and different skin colors. Our country has its own prominent place in this protest movement.

I believe that it is the duty of each individual to join the single universal voice of good will on all continents to prevent an arms race, to curtail it and to support actively all peace actions.

[Question] In conclusion, I will make reference to a valuable exhibit. The original capsule, in which you together with Klimuk made your space flight, stands in an honorable place in the courtyard of the Museum of the Polish Army in Warsaw. Do you ever visit this exhibit which was presented to Poland by the USSR?

[Answer] Yes, and more than once. I went with my mother, my family and by myself; I had to explain every single portion there and its significance. So many of my memories are tied to this capsule... In it, Piotr Klimuk and I were launched and were returned to the earth. It was small, but was able to hold two men. It stands there now peacefully; 5 years ago, it was alive. It has earned well this rest. I will still add that now, after 5 years, I would like to sit down inside it alone and relive one more time this flight....

12247
CSO: 2602/31

END